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MEASUREMENT PROBLEMS AND TABULATION PLANS FOR FOOD CONSUMPTION AND NUTRITION SURVEYS

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ANNEX I: GUIDE LIST OF FOOD ITEMS TO BE INCLUDED IN FOOD CONSUMPTION SURVEYS

METHODS OF MEASUREMENT FOR FOOD CONSUMPTION TOPICS

1. In household food consumption surveys, the method of enumeration to be adopted is determined by the type of respondent and the kind of information to be collected from the survey. Also the choice of a particular method of enumeration is closely related to other aspects of the survey such as the sample design, the reference and reporting period, the plan of field work and data processing.

(a) Some conceptual approaches

(i) Reporting units and respondents

2. The reporting unit which is defined as a group of persons sharing a common food supply may also form a budget unit. In both cases, it may be possible for one member to be appointed to act as an informant on behalf of the whole reporting unit. In certain cases, the budget unit can be divided into two or more subunits. These are composed of people who were wholly or partly independent in the use of their earnings. Although households are often reluctant to use separate booklets for recording expenditure of these subunits, such separate booklets have been found to be useful in improving the reliability of the data. Where the reporting unit coincides with the household or the family, reliance may be placed upon one member, usually the home-maker, to provide the information.

(ii) Food acquired versus food consumed

3. An important aspect of the kind of information required, which will affect the method of enumeration, is whether information is sought on food acquired during the reference period or on food actually consumed during that period. If the aim is to compile averages for groups of reporting units and provided there is no significant change in the overall level of household stocks of food over the time period to which such averages relate, the former should be adequate. If, however, the aim is to obtain data on the food consumed and nutritional intake of individual reporting units, then the latter is to be preferred because the reference period can be shorter.

(iii) Recording at larger stocks

4. In a household food consumption enquiry which forms part of a household budget survey, it is possible to measure both the food acquired and the food consumed provided the operation will not lead to unacceptable levels of non-response and inaccuracy of reporting. It is preferable, in this case to measure the latter directly rather than indirectly, for example, food stocks measured at the beginning of the reference period plus food acquired during the period, minus food stocks measured at the end of the period. This process is laborious and time-consuming and it may therefore lead to non-response or to distortion of respondents' consumption and purchasing behaviour during the reporting period.

(b) Methods of collecting data

5. The three main methods of collecting data on food consumption are interviews, account books, and actual measurement.

(i) Use of interviews

6. In the interview method, the respondent is asked to recollect the quantities and expenditures on food consumed during the reference period. The main disadvantage of this method is that it may be inaccurate because of memory lapses on the part of the respondents. These memory lapses are particularly likely to occur when the reference period is long or in some rural areas where farmers largely feed themselves from their own produce. To facilitate the recall of all foods consumed, the interviewers are usually supplied with a list of foods to use as a prompt list. Visual aids may also be used by the interviewers to assist the informant to recollect the quantity or volume of food consumed. The interview method is the most simple, and response is generally better than with the other methods.

(ii) Use of account books

7. In the accounts book method, the respondent keeps an account of the quantity and the money value of all food items purchased or otherwise obtained during the reporting period. Food stocks are sometimes measured at the beginning and at the end of the reference period. A standard account book or diary is provided to the household by the survey organization. In specialized food consumption surveys, there is usually a day by day record book or diary provided. With this method, the accuracy of the data is less independent on memory. The disadvantages of the technique are that it demands more effort from the respondent and co-operation is therefore likely to be less than with the interview method. The technique may be particularly difficult to apply in some developing countries since it requires a certain level of literacy on the part of the respondent. It is also feasible only where respondents are responsible and willing to co-operate with the survey.

(iii) Use of the weighing method

8. In the weighing method, the food is actually weighed before it is eaten or used for the preparation of a meal or dish. Food wastage and refuse are also weighed in the kitchen and after meals so that net consumption, that is, intakes, can be computed.

9. The method of actual weighing of food is the most accurate of the three methods, because the data are collected by objective procedures which are independent of memory bias. The accuracy of the data will depend on many factors, such as the co-operation of the respondent, the skill of the investigator and the sensitivity of the weighing scales or balances used. With this technique, the respondents are particularly aware of being under observation. They may, therefore, change to some extent their normal eating habits, and their food consumption may assume a pattern somewhat different from their normal one. This method is the most tedious and costly of the three, especially in cases where there are many items to be measured. Moreover, the interviewer cannot be present all the time during the period of the survey, so the weighing method has to be supplemented by information obtained by interview, especially for food eaten between meals. Although there may be a certain degree of non-response due to refusal of the informant to co-operate with this method, experience gained from large-scale integrated surveys (for example, Madagascar: 5,000 households, Tunisia: 3,000, Peru: 8,000, Brazil: 55,000) shows a very low percentage of non-response in surveys using this method. For example, in the Brazilian survey, 2 per cent of the selected households refused to be surveyed, and the range varied from 0.3 per cent in rural areas to 18 per cent in the largest cities (Rio de Janeiro and Sao Paulo).

10. When the eating cycle is adopted as the reporting period, it has been found that at the beginning of the inquiry respondents have a tendency to overestimate their consumption in the case of the interview method and to consume more food than normally in the case of the weighing method. As a result, some surveys, including those using the food account and weighing methods, have excluded from tabulation some initial records obtained during the first 2 or 3 days, on the grounds that they were not representative of the normal household food consumption pattern. For example, in the National Food Survey of the United Kingdom, evidence was found that households purchased greater quantities of food during the first three shopping days. It was therefore decided to omit the first two days' records of data in the final compilation of the results.

11. Where the weighing method is used, it is essential that investigators be adequately trained so that they can secure the co-operation of the respondents in living and eating normally during the period of the survey, without exaggerating their food consumption habits to give a good impression to the investigator. In large-scale food consumption surveys where such training has been effective, the biases resulting from distortion of food habits as mentioned above have generally been found to be negligible. A reporting period of one week, usually adopted in food consumption surveys, is long enough to minimise the effects of shift in consumption habits during the first few days of the surveys.

(c) Other measurements required

(i) Use of local units of measurement

12. In both the interview and the food account techniques, it may be found that not all respondents can express in standard units the quantities of food that are consumed. In such cases the local units will have to be compared with standard units and then converted. The conversion of such local units, which should be undertaken as a supportive activity to an on-going survey, is fairly easy where households use standard containers such as cigarette tins, preserved vegetable tins, etc., but may be somewhat difficult where local containers such as calabashes, local baskets, etc., or where quantities in heaps are commonly used. Under the latter conditions, some surveys have distributed standard containers for use by households for preparing or serving meals. These procedures should be adopted with caution as they may influence the households' food consumption behaviour and may also lead to a certain degree of non-co-operation.

(ii) Measurement of wastage and losses

13. In food consumption surveys using the weighing method, the estimation of food wastage and losses in the final consumption of food is usually incorporated into the survey. Generally, the data concerning food refuse and the edible portion of food are recorded by the weighing method in the kitchen. This latter portion is broken down into effective consumption or intake, edible waste which is thrown away, the part given to pets and other animals, portions given away to other households and the portion of food prepared, which is not consumed during the reference period. The edible waste thrown away or given to animals is generally expressed as a proportion of the total calories in the total household food supply. From the evidence available in developing countries, these amounts have been found to be very low. Results from the Madagascar and Brazil surveys showed an average percentage range of 1 per cent to 3 per cent for this wastage.

14. The factors associated with variations in wastage of the edible portion of food are (urban/rural/metropolitan) income class, family size, period of feast, harvest on food scarcity, storage facilities, for example availability of refrigeration, etc. It may also be useful to analyse the magnitude of wastage of edible portions in terms of major staple foods. For example, the proportion of cooked maize fed to animals has been estimated at 5.6 per cent in Madagascar and 7 per cent in Guatemala. In some other cases, parallel empirical investigations have been undertaken outside surveys to arrive at estimates of food wastage which have then been applied to the results of food consumption surveys.

(iii) Quantification of meals taken outside the home

15. Food consumption surveys generally measure the quantities of food consumed inside the home. However, in order to determine total quantities of food consumed by members of the household, information on meals consumed outside the home by members of the household and those consumed by visitors from the household food supply is normally required. It may also be necessary to calculate at the national level the total human consumption of food, including that consumed in collective living quarters such as hospitals, barracks, camps, etc.

16. A meal attendance questionnaire such as the one used in Brazil, which also is the number of meals taken outside the home (for example, restaurants, canteens, at work or school, other families, etc.), is normally provided for this purpose, and this information is used to arrive at estimates of each household's food consumption. In addition, the information on expenditure on meals taken outside the home is also normally included in such surveys.

17. Another procedure that can be adopted in conjunction with the survey is to obtain information on the type of rations and ingredients of various meals served in various catering establishments for use in determining the quantities and value of meals taken outside the home. This procedure has been adopted successfully in Hungary and tried in the Brazil Survey (1975) but is rather difficult to implement in large-scale food consumption surveys. Where such a procedure is used, it is important to record such meals separately in the case of restaurants, cafes and hotels, hospitals and other medical and educational institutions, as suggested in the System of National Accounts, so as to enable the collation of household expenditure data obtained from food consumption surveys with that in the national accounts and balances.

18. A simpler approach which yields reliable results at an aggregate level is based on transformation of data on the meal attendance record in terms of daily dietary units.

1. Methods of enumeration in individual dietary surveys

19. Individual dietary surveys are undertaken to obtain qualitative and quantitative data on the diet of individuals or special groups, for example, pre-school children, school children, pregnant or lactating women, etc., and also, when combined with household surveys, to determine how food is used or allocated within the household. Various techniques have been developed for investigating individual diets, and the main procedures discussed briefly below consist of (a) the dietary history method, (b) the recall of past food intake and (c) the records of current food intake.

(a) Dietary history method

20. This method is carried out by interviewing individuals or through questionnaires requesting information on what food they usually eat and their approximate amounts. This qualitative type of enquiry is used to obtain information on the usual food consumption of an individual over a recent or past period of time. It reveals major dietary problems, for example, low consumption of nutrients in the diet, and can be used as a basic for subsequent improvement in the food consumption patterns of the individual. The method places a low burden on the respondent but is liable to overestimate intakes if the objective is to obtain quantitative data.

(b) Recall of past food intake

21. This method is used to obtain information of food consumed over the past 24 or 48 hours by an individual. The interviewer should be a trained nutritionist or dietician, or at least familiar with local methods of food preparation. Aids such as food models, measuring cups and spoons or glasses and bowls may be used to help respondents estimate portions consumed. Studies of this method indicate that food consumed may be underestimated due to the greater concentration on main meals than on in-between snacks, which may be of great importance in certain countries. The advantages of the method include low respondent burden, decreased time and expense in interviewing, inclusion of food eaten away from home and less influence on eating pattern. The method is reasonably accurate in obtaining information on average amounts of various food groups consumed by individuals, but not individual intake of each separate food. In some cases, the method cannot be used as a basis for obtaining food consumption or dietary patterns because of its short recall period.

(c) Records of current food intake

22. This method involves accurate weighing of foods by the investigator prior to their consumption by the individuals. The investigator may also have to provide estimated records of the food consumed. The method of weighing can be used by the individuals themselves after explanation by the investigator and can also make use of household measures, for example, cupfuls, spoonfuls, counts, etc., instead of actual weighing. The weighing of food must be very accurate and care must be taken to weigh only that food which is to be eaten. Also, all amounts, including small portions that may be of considerable nutrient value, must be weighed in order to give an accurate picture of food consumed.

23. The advantages of this method are that it results in a very high degree of accuracy when carried out correctly. However, it is tedious and likely to affect the eating pattern of those investigated. Responsiveness and co-operation are required from the individuals under investigation. It is cumbersome to apply, especially in communities whose individuals eat from the same pot and it can be subject to error from inaccurate weighing or dishonesty on the part of the individual. Further inaccuracies and errors occur when household measures are used instead of standard weighing measures. The method is also costly, and since only a few individuals can be covered at a time, sample sizes are restricted, which may especially affect estimates for the critical age groups of the population.

24. Another consideration relates to individual versus household consumption in food consumption surveys. Individual dietary surveys provide data on dietary intakes of individuals of given age and sex which cannot be obtained from a household food consumption survey. They provide data that may reveal wide variations in intakes of individuals within the same household, and these intakes may not be in proportion to recommended intakes, especially for vulnerable groups comprising children, lactating and pregnant women and the elderly. Differences in nutritional requirements, food preferences, family and community customs, daily routines and activities of family members affect the dietary intakes of individuals in the households. Such data are useful for nutrition programmes aimed at at-risk individuals, and for intervention programmes requiring knowledge of the distribution of food within the family.

25. Comparisons of average recommendations for nutrient intake with averages for household food consumption are based on the assumption that family distributions of nutrients are in proportion to recommendations. Also critical is the allocation on a per person basis of the nutrient content of the household food supply for each nutrient independently, regardless of its source. It may happen that some foods are largely consumed by certain members of the household and while the rest consume them very rarely. Collection of information on both individual food intake and household food intake thus provides clearer insights into how food is consumed and allocated within households.

2. Methods of measurement in nutritional status surveys (anthropometry)

26. Cross-sectional anthropometric data collected on a large-scale basis give a good and quickly obtained picture of the nutritional status of individuals in a population. For children, reliance should be placed on weight for height as an indication of the present state of nutrition and on height for age as an indicator of past nutrition. 1/ Height for age is a particularly useful and valid indicator for the measurement of the nutritional status of children under one year of age.

27. The methods used are relatively simple and can easily be adopted as part of an on-going household survey. 2/ Precautions necessary include the suitable training of field personnel, adjustment of scales before each measuring cycle, checking for observer error and the rotation of field workers among groups of subjects to be measured.

(a) Age

28. Age data are critical in this field. Various precautions and procedures must be observed to obtain accurate age data. These are discussed in other portions of this Handbook.

1/ The presentation and use of height and weight data for comparing the nutritional status of groups of children under the age of 10 years.

2/ For details, see Measurement of Nutrition Impact (Geneva, WHO, 1979).

(b) Weight

29. The types of measuring instruments are the following:

- For children below 6 years: a SALTER spring balance (Model 233 PBW) with a scale measuring up to a maximum of 25 kgs. in increments of 100 grams is recommended. With this type of balance, the child hangs in a specially designed "bag". This model is sturdy, compact and can easily be transported;

- For children 6 through 9 years and adults: a bathroom scale on which the person stands. The apparatus usually reads to a maximum of 100 kgs. in increments of 100 grams. In both these age groups the readings are taken to the nearest 100 grams.

30. For older children 2 years and above and adults, a vertical measuring rod can be employed. For infants and pre-school children below 2 years, recumbent length (crown-heel length) has to be measured. This is usually done with a wooden length-board or infotometer.

31. For international comparability of the data, indicators on weight for age, weight for height and height for age are compared with those obtained from an international reference population. The Boston Standard has generally been accepted as a suitable yardsticks for comparison with local measurements. For national use and in countries where local references are not available, it is useful to define suitable targets or yardsticks for the local population, based on the weights and heights of healthy and well-nourished children in the same country, for use in interpreting the results.

3. Time coverage of the survey

32. There are aspects of time coverage to be considered in a food consumption survey, namely: (a) the period to be represented by the survey and for which results will be presented, usually called the period of the survey; (b) the period of time to which the records provided by an individual household relate, usually called the reference period; and (c) the period over which a reporting unit is actually engaged in providing the information required for the survey, usually called the reporting period.

(a) Period of the survey

33. The economic and nutritional concerns of most household food consumption surveys make it desirable that the overall period of the survey should cover at least a 12-month period. Surveys which represent a period shorter than a year may give results which are not typical of the year as a whole. Ideally, the survey should be carried out continuously throughout the year and separate results for each season should be tabulated to show the extent of seasonal variation.

34. In such a case the choice is between completely rotated samples and a survey with repeated visits to households throughout the year or some combination of the two approaches.

35. In the case of rotating samples, the year is normally divided into a number of shorter periods, and in each period or cycle only a part of the total sample is surveyed, usually with each household having reference and enumeration periods of shorter duration. More generally, the year can be split into short periods corresponding to the enumeration period and the same number of households surveyed in each short period. In this case, it is essential to divide the universe into homogeneous ecological zones in which subsamples of households are selected for random distribution throughout the different periods of the year. The rotation of the sample should also be done at random on a geographical basis within each operational area. Some examples of country practices in recent food consumption surveys are the division of the year into 24 periods of two weeks' duration in Sweden, 12 periods of one month in Canada, the German Democratic Republic and Greece, and eight periods of six weeks' duration in France.

36. Alternatively, use can be made of repeated samples (the panel method) whereby the panel consists of a sample of households which is normally fixed, with all households participating in the survey in each cycle or season, subject to some rotation after participation for a certain length of time. For example, panels were revisited two or three times in household budget food consumption surveys adopting this approach in Burundi, Togo, Chad and Colombia.

37. There are various trade-offs in terms of the value of data furnished, possible co-operation of households, non-response, sample size, cost, etc., between a food consumption survey using completely rotated samples and a survey adopting repeated samples.

38. The repeated sample approach is generally used to minimize memory lapses on expenditure items and to obtain precise measures of trends or variations in food consumption and nutritional status of individual households throughout the year. Attempts to overcome by repeated visits, the disadvantages of recall and of partial knowledge of the food consumption level of particular households resulting from rotated samples are usually at the expense of reduction in sample size, either because of the cost factor or some fall-off in response, or both.

39. With the use of completely rotated samples, it is not possible to derive meaningful annual figures of the percentage of households using a particular item of food or group of foods by combining seasonal percentages because different households are surveyed in different seasons. With the panel method, on the other hand, meaningful percentages can be computed. Moreover, since estimates of the annual income and consumption of individual households can be computed, valid frequency distributions of households by levels of food intake can also be provided. Such data are particularly useful in studies undertaken on income distribution and the estimation of numbers undernourished.

40. The panel method may introduce some bias in the results obtained and also lead to non-response as compared to methods using completely rotated samples. However, since discontinuity in time-series must also be avoided, partial replacement, say after six months, is often used. A more elaborate procedure was adopted in the Household Consumption Expenditure Survey of four cities in Colombia in 1967/68. In order to have trimestrial subsamples to facilitate the collection of data and to study seasonal variation in the consumption of district products, the sample of 2,103 was divided into eight groups, of which the first was surveyed in all trimesters, three were interviewed twice but in different trimesters and four interviewed only one each in different trimesters.

(b) Reference period

41. In an integrated household budget and food consumption survey, where food actually consumed is recorded, the reference period for which data is collected should be long enough to cover a complete "eating cycle", which generally might be as short as a week. As far as food expenditure is concerned, a "buying cycle" of one month is usually adopted. This usually corresponds to the periodicity of wage payments, especially in the urban areas. The period may even be longer than a month if the households possess the facilities for long-term storage of food and have to buy and hold substantial stocks. For other expenditure items, the reference period depends on the frequency of purchase in relation to the memory of informants in recalling them. Thus in integrated surveys various reference periods are often adopted for various items of expenditure and linked to the period fixed for the food record part of the survey.

(c) Periods of enumeration

42. The methods and periods adopted for collecting data will vary depending on particular items and the ability of households to recollect them. In the case of food consumption surveys a continuous recording period is usually adopted, using the weighing method, with daily visits of enumerators to the households. In this case the enumeration period coincides with the reference period. For items of food expenditure of food acquired, an enumeration period of one month is usually adopted, but with recording periods every day, every two or three days, or once a week, etc., depending on the types of information collected and conditions prevailing in a particular area. For example, in rural areas, consumption of own produce may have to be recorded at least daily or at intervals of not less than once a week. This requirement is often overlooked by survey planners. On the other hand, items of food expenditure in the rural areas may be recorded only once a week, while in the urban areas they should preferably be recorded every day, or at least twice or three times per week. Enumerators may also be instructed to return to households outside the period of their continuous investigation to ask retrospective questions on expenditures during the intervening period. A wide range of procedures has been used in different surveys and countries need to experiment to determine the most suitable reference and enumeration periods for food and non-food items included in their surveys.

43. In the 1975 Tunisia Household Budget and Food Consumption Survey, the weighing of food was carried out over a week's period with daily visits by enumerators to the household. Records on expenditure on food were also taken covering a one week period, together with some other items of consumption expenditure such as petrol, hairdresser expenses and tobacco. The above items were again recorded at 10-day intervals for expenses incurred during the week, including consumption of own produce, for comparison with daily records. Other general information on household expenditure on items such as dwellings, durables, transport and travel relating to two, three or eleven preceding months, as well as data on employment and income, were recorded during the periods of enumerators' visits to households.

44. Another example summarizes the procedure adopted in a household budget and food consumption survey conducted in Louga-Zinquere in Senegal in 1978. The food consumption part of the survey was carried out over a period of five days using weighing methods. The household budget survey was undertaken by interviewing families on their income and by recall on their expenditures for groups of expenditure items, during 10 days with daily recording of expenditure, and during 20 days with two recall interviews relating to the preceding 10 days.

45. On the basis of this scheme, six households were covered in both the budget and food consumption surveys by one enumerator in one month, as follows:

$C + B_j \cdot B_j$	BI	BI	First household
$B_j \cdot C + B_j$	BI	BI	Second household
BI	$C + B_j \cdot B_j$	BI	Third household
BI	$B_j \cdot C + B_j$	BI	Fourth household
BI	BI	$C + B_j \cdot B_j$	Fifth household
BI	BI	$B_j \cdot C + B_j$	Sixth household

C = recording of food consumption by weighing

B_j = recording of daily total expenditure

BI = recording by recall method over the preceding 10 days.

4. Some operational considerations

46. The above discussion shows that the collection of data on food consumption and household budgets requires the careful planning of field operations. It further shows that for these types of surveys the enumerators must often work in restricted localities or villages in order to carry out daily visits to selected households. Only a few of these households (about four as a maximum, half of which are normally investigated for food consumption) can be covered by each enumerator in one day. In sparsely populated areas, the number of households each enumerator can cover in one day is severely limited due to the time required for travel. As a result household budget and food consumption surveys of this nature undertaken in developing countries have covered limited samples in the case of repeated samples. However, sample sizes have been fairly large in surveys adopting rotated samples (Brazil 55,000, Madagascar 5,073, Peru 7,933, Tunisia 4,962). These samples generally worked out at sampling fractions ranging from

1/200 to 1/380 and at estimated costs ranging from $US80-120 per household. Experience in the integrated surveys noted above also shows that in general the enumeration periods cover seven days plus two days for travelling and rest. This amounts to about 40 working periods per enumerator per year. Empirical study is required to determine the optimum reference and enumeration periods, frequency of enumerators' visits to households and workloads for enumerators in integrated household survey programmes in developing countries.

POSSIBILITIES FOR TABULATION AND ANALYSIS

47. The analysis and tabulation of the data obtained from a food consumption survey depend in the first instance on national requirements and capabilities. Each country must decide on the analyses, tabulation and studies which are necessary to satisfy its own requirements. Over and above such internal needs, however, there is mutual benefit to be gained by comparing the survey findings in one's own country with those in others. Common problems are thereby identified or highlighted and ideas as to their solution may be shared. In addition, work at the international level for encouraging, co-ordinating and evaluating world programmes for improvements in food production and distribution is facilitated if world-wide data on food consumption and requirements are available. Such work requires common standards of data presentation and a common channel through which the survey results can be disseminated. However, such international needs for data should not be achieved at the expense of national requirements.

1. Nutritional evaluation

48. The derivation of estimates of energy and nutrient intake from food consumption data and their comparison with scales of nutritional requirements can take up an appreciable part of the data processing capacity available to a food consumption survey, and it imposes a number of constraints in terms of data elaboration.

49. The first essential relates to data on food quantities. For economic analysis, it is essential that food consumption be expressed in terms of food as purchased. In order to ensure uniformity in the results, it may be necessary to convert the food items to a common state, for example, data recorded in terms of edible portions or of registered food preparations which have to be broken down into various ingredients as purchased.

(a) Food composition tables

50. The final list of individual food items must be sufficiently detailed for them to be classified according to a system which is sensible for both nutritionists and economists. To determine the nutritional content of food, it is also necessary to provide food composition tables based on whatever description and classification of food is used. 1/ These tables give the nutritional composition

1/ Food composition tables available at international level are: Food composition table for use in East Asia, FAO/United States Department of Health, Education and Welfare, 1972; food composition tables for use in Africa, FAO/United States Department of Health, Education and Welfare, 1968; food composition tables for use in Latin America, INCAP/ICNND, 1961; and food composition tables for international use, FAO, Rome, 1954.

of food in terms of 100 grams of edible-portion. Therefore, as far as possible, various factors derived from the survey are used to convert food consumption into edible portion and to calculate from the food composition tables the energy and nutrient content of that consumption. By deducting from the previous results the leftovers recorded during the survey and then transforming these results into nutritional values, the energy and nutrient intake of food consumed can be established.

(b) Scale of nutritional requirements and allowances

51. From the individual data on age, sex, height and body weight and occupation, and using available scales of nutritional requirements, the individual requirements of each person in the household who took part in the survey can be calculated. National scales of nutritional requirements are sometimes available. However, the recommendations prepared by FAO and WHO are being increasingly used. These scales of requirements for energy and protein are regularly revised in order to take into consideration new developments in the state of knowledge in this field. Besides the recommendations on nutritional allowances, other scales of minimum nutritional requirements are currently under consideration for use in identifying groups of the population at great risk of malnutrition.

52. The tendency in the near future may be to analyse the results of food consumption surveys in terms of two scales based on nutritional recommendations and minimum requirements. The first scale will be used to determine the level of well-being of the population and the second scale will be used as an indicator of severe deprivation. Experimental work on the use of these two standards has been undertaken on the results of food consumption surveys conducted in Brazil and Tunisia.

(c) Scaling systems and nutrition units

53. Mention has already been made of the use of data on the median weight for median height by age and sex for the estimation of average energy requirements per day, by age and sex of the population. These figures are used to prepare scales of nutrition units, taking a male of 25 years of age with moderate activity as a standard.

54. For instance, in the Brazilian survey the scaling system based on average energy requirements per day by age and sex and according to the median weight for median height gave the following figures:

Age (years)	Coefficients	Age (years)	Coefficients	
			Males	Females
0 - 1	0.30	14	0.85	0.80
1	0.39	15	0.90	0.80
2	0.43	16	0.95	0.80
3	0.48	17	0.97	0.80
4	0.52	18	0.99	0.80
5	0.54	19	0.99	0.80
6	0.57	20 - 29	1.00	0.80

Age (years)	Coefficients	Age (years)	Coefficients Males	Females
7	0.60	30 - 49	1.00	0.80
8	0.63	50 - 59	1.00	0.80
9	0.67	60 - 69	0.90	0.70
10	0.70	70 - 79	0.90	0.70
11	0.74	Over 79	0.90	0.70
12	0.76			
13	0.78			

55. For specific purposes such as comparing the distribution of nutrients, that is, protein, vitamins and minerals, among households, other scaling systems can also be established. However, such scales are not as general as scales constructed on the basis of energy requirements.

(d) Allowance for meals taken outside the home

56. It is generally impracticable to collect data on quantities of food eaten outside the home, that is, food not provided from the common household food supply. Therefore, the data on nutrient intakes from a survey are based only on quantities of food eaten from the common household food supply whereas the scales of nutritional requirements are with respect to total daily needs. As a result, it is necessary to make some adjustments to requirements so that they are comparable with the intakes recorded. On the basis of the number and types of meals obtained inside and outside the home by each member of the eating unit, and using a meal weighing system derived from the food intake results, one can determine the individual daily index of attendance at home meals. The daily requirements, weighed by this index, give the daily adjusted requirements which, after summing up at the eating unit level, can then be compared with information on intake.

chapter.

(e) Uses and interpretation of results

57. It follows from the foregoing discussion that the comparison of the estimates of nutrient intake with estimates of requirements or some other standard are of a very rudimentary nature, and caution must be exercised in the interpretation of the results of such comparisons, especially when the differences are of relatively minor magnitude, since they are subject to varying degrees of uncertainty.

58. National average figures may conceal vital differences among different sections of the population arising both from unevenness in the distribution of available supplies as well as differences in requirements. Although further analysis of the survey data will enable intake to be compared with requirements separately in each population group, the value of the between-group comparisons of the resulting ratios will depend very much on the extent to which they have been affected by sampling and other errors including those due to the use of estimation. At best, they will

pinpoint those population groups which might need special attention regarding food and nutrition, and to which further full-scale individual dietary surveys combined with physiological and clinical measurements might be directed so as to assess their true nutritional status and thus form a basis for selective food and nutrition policies.

59. The whole process of using the data obtained from food consumption surveys to provide estimates of nutrient intake in relation to requirements or other standards is thus seen to be beset with problems for which no simple and precise solutions are available. Assumptions and approximations have to be introduced. Some of the problems are all the more acute if the food consumption survey is incorporated in and becomes part of a household budget survey. To this extent they reinforce the argument in favour of linking food consumption surveys to a budget survey in preference to incorporating them into the normal budget survey procedure.

2. Data processing requirements

60. The use of electronic computers is now widespread for processing survey data and this provides opportunities following field checking for logical checks and other correction procedures to be carried out which formerly would have fallen to editing and coding staff or would not have been done at all. It should be borne in mind that, in a food consumption survey, each household's record provides a long string of data, that a large number of household records is usually obtained during the course of a year, and that this may give rise to problems of access to the data which have been read into the computer and of its linkage to files of food composition tables of nutrient requirements or recommended intakes, and similar reference material. It is therefore important at the outset to consider a system which will have the capacity to perform all the tasks that will be required, and it be prudent to ensure that sufficient additional capacity is available to allow for some future expansion.

61. The returns on survey costs, including costs of subsequent storage are the benefit resulting from maximization of data use. This means rapid and constant access to information without additional cost for the reprocessing of derived variables. Moreover, data have different uses in the short term and in the long term, that is, in time series. This should be taken into account in the preparation of a system directed to the optimization of data use.

62. Food consumption surveys with a variety of objectives should be subject to integrated analysis using a hierarchy of reporting units such as household, budget unit, eating unit, individuals, for various items of information such as daily food consumption per meal and per product, etc. After the release of the initial tabulations and report of survey results, the data base should always be kept in a form suitable for continuing access and analysis of the data. Such a data base, when organized in the form of a structured collection of record files, provides an integrated data processing and calculating system for use in analysis of the data, purposes of interest to users. Such a system increases the possibilities of in-depth analytical studies using the survey results, such as a study of household economic and nutritional profiles or the quantification of malnutrition.

3. Possibilities for tabulation of data on food consumption and nutrition

63. Although the tabulation of the data and their presentation in summary form are among the last operational phases of a survey, a draft tabulation programme should be prepared at the questionnaire design stage so as to ensure that the data to be collected will be in conformity with data requirements. In addition, an expanded tabulation plan should be prepared at an early stage taking into consideration the quality of data, the details of breakdowns that can be provided within acceptable limits of accuracy, the capacilities for further calculations and the priority needs of the different users. A list of illustrative tabulations divided into minimum and extended tabulation plans is given below. This list is illustrative and should not be taken as representing a formal recommendation.

(a) A minimum tabulation plan

64. The population groups for which consumption patterns should be shown may be derived from the following:

(i) All households
(ii) Urban/rural
(iii) Farm/non-farm
(iv) Socio-economic groups
(v) Households by size

65. Breakdowns according to urban/rural, farm/non-farm, socio-economic groups and household size should be made on the basis of local conditions. When information on income or total living expenditure is available, the data can be classified either on a per capita basis or on a per household basis. Per capita estimates provide a better indicator of the economic status of households, but if used for making comparisons between groups, it should be remembered that they mask differences, due to differences in age, sex and other characteristics of persons in the different groups. The classification according to household size can usefully incorporate some discrimination among families of different composition.

66. The statistics shown for each population group should present the food consumption pattern of the group in terms of the following:

(a) Average quantities of different foods eaten at home (and away from home if such information is available), with separate averages, where important, for food purchased and for home-produced food and food otherwise obtained per person (or household) per week (or otherwise specified time period);

(b) Average money value of different foods (and the total for all foods) used at home per person (or per household) per week (or other time period) with separate averages, where important, for food purchased and for food otherwise obtained (including home-produced food). Expenditure on food purchased and eaten away from home should also be shown;

(c) Average energy value and nutrient content of food used per person. The contribution of each food group to the total of each nutrient should also be shown.

67. The descriptive information for households in each population group should include:

(a) The number of responding households in the sample;

(b) The average household size;

(c) The average income or other measure of economic status used for classifying the household.

(b) Expanded tabulation plan

68. The first three of the four types of data specified under the minimum tabulation plan may warrant further detailed analysis and tabulations. The expanded programme here described should therefore be considered in connexion with more elaborate surveys, to supply information on the levels and patterns of food consumption and for other analytical purposes such as demand analysis, and for use in conjunction with the results of other surveys on levels of living and basic needs.

69. The statistics to be shown for each population group might be expanded, in comparison with those shown for the minimum plan to include:

(a) Comparison of the nutritive value of the diet with requirements or recommended allowances;

(b) Distributions of households according to levels of nutrient intake or according to intake relative to requirements or allowances;

(c) Percentage of households in each population group using (or purchasing) specified foods;

(d) Distributions of households by amount of food expenditure;

(e) Average prices paid for different foods by different population groups;

(f) Various derived statistics such as demand parameters, indices of food prices, food expenditure and food quantities; costs per calorie from the various foods.

70. Further tabulations in the expanded plan should also present material concerning the quality of the data which is being presented, as discussed in the next section, below.

METHODS OF EVALUATION OF DATA QUALITY

71. The previous sections of this chapter discussed some general requirements for reducing or controlling the magnitude of sampling and non-sampling errors and biases in food consumption surveys. The present section presents some of the methods that can be used in evaluating the quality of survey results. As the experience in food consumption surveys undertaken in developing countries is still very limited, reference will also be made to a few procedures that have been adopted in developed countries.

1. Calculation of sampling errors

72. The extended tabulation plan discussed above should include provision for calculation and presenting sampling errors relative to all the total average in the tabulations prepared on the results of food consumption and nutrition surveys. Since such computations may present a formidable task for countries without adequate data processing facilities, the minimum requirement is to present such errors for total energy and protein intakes, for totals of staple foods consumed and for the major groups of items on expenditure. The minimum tabulation plan presented in section D could serve as a useful basis for selecting a short list of items for which to calculate sampling errors.

2. Treatment of non-response

73. The magnitude of overall non-response due to all causes (for example, outright refusals, untraceable families, families with incomplete records, etc.) is very small in food consumption surveys conducted in developing countries. Survey results available show that non-response hardly reaches 10 per cent in these countries. (Examples are Brazil, 2 per cent, Tunisia, 5 per cent, Trinidad and Tobago, 7 per cent.) Analysis of these results shows that the great proportion of the overall non-response is usually due to families that could not be contacted due to changes in their address, prolonged absence from dwellings and unavailability for participation in the survey for social or cultural reasons.

74. On the other hand, in the developed countries the degree of non-response in food consumption surveys is usually high and may reach levels around 50 per cent. (Examples available range from 14 per cent in Cyprus to 50 per cent in the United Kingdom.) Despite the generally good experience with non-response in developing countries, it is essential that survey planning take every precaution to ensure that any problems which arise can be properly dealt with.

75. Most food consumption surveys conducted in both developing and developed countries have emphasized certain procedures for reducing non-response and other related non-sampling errors and potential sources of bias encountered at various stages of these surveys. These have comprised measures such as the suitable planning of field operations and timetables, the arranging of publicity campaigns to promote the co-operation of respondents in the survey, planning of field operations including the proper selection, training and motivation of interviewers, strict checking and editing of completed schedules, etc.

3. Use of internal consistency checks

76. Several internal consistency checks have sometimes been applied to the results of food consumption surveys at the data processing stages, and a few of these will be mentioned here, without attempting to present a comprehensive picture.

77. The average per capita consumption of the staple foods which constitute the bulk of the household diet in developing countries can be used as an indicator of the accuracy of the results of food consumption surveys. Since it could hardly be expected that an adult would consume more than one kilogram of cereals a day, any household records showing per capita consumption of staple foods for adults

in excess of one kilogram per day are likely to be erroneous. Similarly, records of per capita consumption of energy by adults much in excess of 5,000 calories per day are likely to be suspect, and the error may be traced to figures on quantities consumed or to the omission of certain household members, guests or visitors who may have participated in meals served on that day.

78. Another method of evaluating the quality of food consumption survey results is based on the computation of scatter diagrams of households' per capita energy intakes against requirements, which can be encircled by an ellipse determined in such a way that the probability of any household falling outside its boundaries is less than 5 per cent. All households whose positions fall outside this curve can then be re-examined on the basis of the original records for purposes of finding the error and making suitable corrections in the original data. Usually, such errors are found to have resulted from the quantity or type of commodities consumed, the estimation of wastage, and the conversion factors used in translating quantities into their energy content.

79. A similar scatter diagram can also be prepared by computer on relationships between weight and height of children in the case of anthropometric data. Again, the units falling outside a predetermined threshold can be retrieved for fuller evaluation and adjustment.

80. One way in which the accuracy of the quantity and expenditure records has been assessed is by dividing expenditure data of certain important food commodities by their quantities and comparing the results with the known unit prices of these commodities at the time of the survey. Other internal consistency checks which have been used in the process of collecting records on household budgets and food consumption consist of the control of expenditure data through comparison with figures of disposable or other related forms of family income.

4. Use of external consistency checks

81. The comparison of survey results with other statistics on quantities and expenditure on food may also serve as an excellent means of evaluating the quality of data obtained from food consumption surveys.

82. Food consumption survey results at the aggregate level can be compared with the results of food balance sheets. The latter measure per capita food supply or apparent consumption as obtained from the total of foodstuffs produced in the country plus imports, after making adjustments to allow for changes in stock, subtracting quantities put to non-food uses (including use for seed and feed and manufacture) and losses to arrive at domestic food supplies in quantities and nutrient value, which are then divided by estimates of the total population. Such comparisons should ensure that the quantities entering into the above aggregates are reliable. However, it is necessary to check on the commodity coverage, especially the coverage of home-produced food that may not always be covered in food balance sheets. Other possibilities concern comparison of two estimates at the same level, for example, the retail level. In any case, allowance must be made for food consumed at institutions and similar catering establishments.

83. Data on food expenditure obtained from food consumption surveys can also be compared with estimates of private expenditure on food available in national accounts and balances. Care should be taken to ensure that the commodity coverage is compatible, allowance is made for food taken at restaurants or other catering institutions and that valuation of items is based on farm-gate or producer prices. Where countries conduct separate household expenditure surveys, the results of their aggregate food expenditures can be compared with similar data obtained from a food consumption survey. The former data should be carefully reviewed for population and commodity coverage, especially the coverage of own-produced food. This is because consumer expenditure surveys are often restricted in these respects, since their primary purpose may be to obtain weights for consumer or retail price indices.

GUIDE LIST OF FOOD ITEMS TO BE INCLUDED IN FOOD CONSUMPTION SURVEYS

I. FOOD FROM THE COMMON FOOD SUPPLY

1. Cereals and cereal products

1.1 Grains as whole grain, meal, flour
(specify where important: wheat, rice, rye, barley, oats, maize (corn), millets, sorghums, etc.)

1.2 Pastes: macaroni, spaghetti, etc.

1.3 Commercially baked goods
(specify where important: bread and other baked goods)

1.4 Other cereals and cereal products
(specify where important)

2. Starches and starchy roots

2.1 Potatoes
(specify form where important: fresh (new, old), canned, dehydrated, flour, etc.)

2.2 Sweet potatoes
(specify form where important: fresh, flour, etc.)

2.3 Cassava
(specify form where important: fresh, meal, flour, etc.)

2.4 Other starchy roots
(specify where important)

2.5 Starches (pure, dry)
(specify where important: wheat, maize, rice, potato, cassava starches, sago, etc.)

3. Sugars and sweets

3.1 Sugars
(specify where important: crude, refined, cane, beet, palm, coconut, maple, etc.)

3.2 Syrups and molasses
(specify where important: molasses of cane sugar, of beet sugar, cane juice, cane, maple, corn, carob, grape, date syrups, etc.)

3.3 Honey
(including honey in the comb, etc.)

3.4 Others
(specify where important: jams, marmalades, candy)

4. Pulses (dry)

4.1 Beans
(specify where important: broad beans, kidney beans, lima beans, mung beans, etc.)

4.2 Peas
(specify where important: dry peas, lentils, chick peas, etc.)

4.3 Soybeans and soybean products
(specify where important: whole soybeans, soy sauce, soybean curd, soybean paste, soybean milk, soybean flour, etc.)

5. Nuts

5.1 Groundnuts
(specify form where important: in shell, shelled, roasted, salted, in butter, etc.)

5.2 Coconuts
(specify form where important: mature nuts, immature nuts, coconut milk, shredded coconut, etc.)

5.3 Other three nuts
(specify where important: almonds, pistachios, cashew nuts, walnuts, pecan nuts, wild or unspecified, etc.)

6. Seeds

(specify where important: squash, watermelon, sunflower, sesame seeds, etc.)

7. Vegetables

(unless otherwise specified, fresh forms will be assumed. Where important, canned, frozen, powdered, dried - except dry pulses -, strained, chopped, pickled, etc., should be specified).

7.1 Roots, bulbs and tubers
(specify where important: beets, carrots, kohlrabi, leeks, mature onions, okra, parsnips, radishes, horse radishes, salsify, scorzonera, turnips, ratabaga, etc.)

7.2 Leafy vegetables
(specify where important: bean sprouts, beet greens, brussels sprouts, cabbage, cassava leaves, celery, chicory and endive, kale, lettuce, mustard greens, okra leaves, parsley, spinach, onion leaves, other leafy vegetables).

7.3 Tomatoes
(specify where important: fresh, canned, etc.)

7.4 Other vegetables, edible flowers, stems
(specify where important: artichokes, asparagus, broccoli, cauliflower, celeriac, chayots, cucumbers, eggplant, sweet corn, pumpkins, squashes, gourds, red or green peppers (fresh), beans and peas (fresh), etc.)

8. Fruit

(unless otherwise specified, fresh forms will be assumed. When important, canned, frozen, strained, chopped, etc., should be specified).

8.1 Bananas and plantains

8.2 Citrus fruit
(specify where important: grapefruit, lemons, limes, oranges, etc.)

8.3 Fat-rich fruit
(specify: olives, avocados, etc.)

8.4 Other fresh fruit
(specify where important: apples, apricots, berries, breadfruit, cherries, dates, figs, grapes, guavas, jackfruit, mangoes, melons, papayas, passionfruit, peaches, pears, persimmons, pineapples, plums, pomegranates, quinces, sapodilla, sopote, soursop, etc.)

8.5 Dried fruit
(specify: dates, figs, raisins, etc.)

9. Meat and meat products, poultry and insects

9.1 Fresh and frozen meat
(specify where important: beef, veal, pork, mutton and lamb, goat, buffalo, camel, horse, rabbit, venison, whale and other domestic or wild species)

9.2 Offal
(specify where important: animal and type, that is, liver, kidney, brain, heart, sweetbread, etc.)

9.3 Meat products
(specify where important: bacon, ham, dried beef, dried pork, canned beef, canned pork, sausages, according to main types, etc.)

9.4 Poultry and wild birds
(specify where important: chickens, ducks, geese, pigeons, turkeys, etc.)

9.5 Insects
(specify where important: distinguishing at least between adult insects and larvae)

10. Eggs

(Assumed fresh, unless specified: dried, frozen, yolks, whites; specify where important: hen, duck, goose, turtle eggs, etc.)

11. Fish and shellfish

11.1 Fish, fresh
(specify where important, making a distinction at least between fat fish (salmon, trout, herrings, mackerel, etc.) and low-fat types (cod, haddock, etc.))

11.2 Shellfish fresh
(specify where important: lobsters, crawfish, crabs, shrimps, oysters, clams, mussels, etc.)

11.3 Fish, salted, smoked or dried
(specify where important: fat-rich types and fat-poor types)

11.4 Fish, canned
(specify where important: in oil, not in oil, fat-rich types, fat-poor types)

11.5 Shellfish, canned
(specify where important: lobsters, crawfish, crabs, shrimps, oysters, clams, mussels, etc.)

11.6 Other aquatic animals (alligators, turtles, frogs, etc.)

12. Milk and dairy products (excluding butter)

12.1 Milk, liquid, whole
(specify where important: cow, goat, sheep, buffalo, camel, etc.)

12.2 Milk, liquid, skim or buttermilk, partly skimmed milk

12.3 Cream
(where possible specify fat content)

12.4 Cheese
(specify important varieties: hard, soft, semi-soft, from whole milk, partly skimmed milk, skim milk; whey cheeses, hard, soft, semi-soft, etc.)

12.5 Milk, processed
(specify where important: evaporated, whole, unsweetened milk; condensed, whole, sweetened milk; condensed, skim, sweetened milk; dried whole milk; dried skim milk; yoghurt and other fermented milk, etc.)

12.6 Yoghurt, other fermented milk and fresh milk product

12.7 Ice cream

13. Oils and fats

13.1 Vegetable oils and fats
(specify where important: oils, hardened shortening, etc.)

13.2 Animal fats
(specify: butter, ghee, lard, suet, tallow, etc.)

13.3 Marine oils
(specify)

13.4 Mixed products of vegetable, animal or marine origin
(specify)

13.5 Other oil and fat products
(specify where important: mayonnaise, dressings, sandwich spread)

14. Miscellaneous

(specify where important: spices, cooking chocolate, cocoa, yeast, other raising agents, salt, condiments, etc.)

15. Prepared or partially prepared mixtures of food and prepared meals obtained outside and consumed at home
(specify)

16. Beverages

16.1 Alcoholic drinks
(specify where important: beer, wine, spirits, etc.)

16.2 Canned or bottled soft drinks
(specify important varieties)

16.3 Other beverages: tea, coffee, yerba, mate, etc.

II. PURCHASED FOODS EATEN AWAY FROM THE HOME

1. Meals, snacks, etc., with specification of type and quantities of the food eaten, wherever possible.

2. Alcoholic drinks, with specification of the drinks as beer, wine, spirits, etc.

3. Ice cream, soft drinks, chocolate and sugar confectionery.